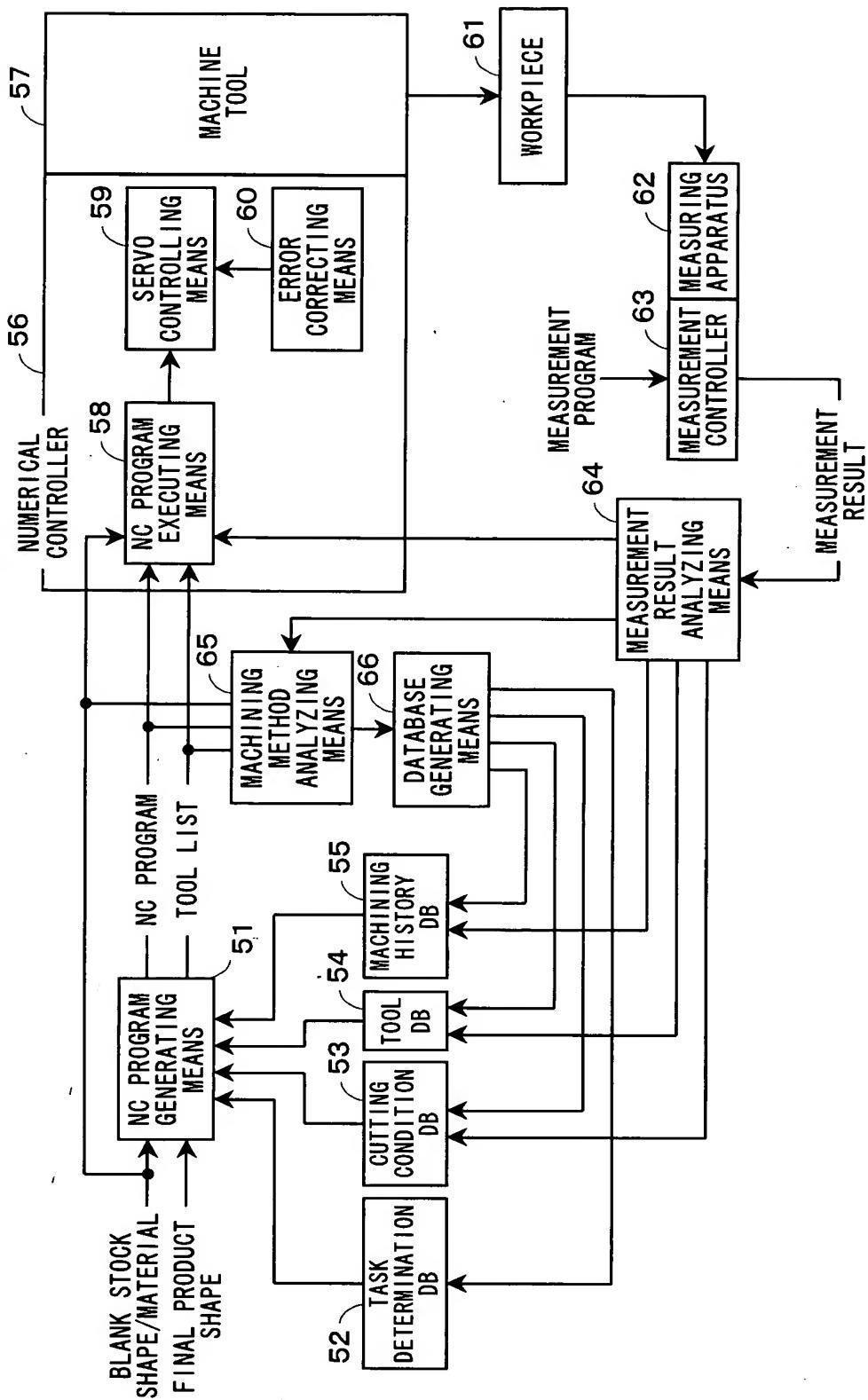


FIG. 1



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FIG. 2

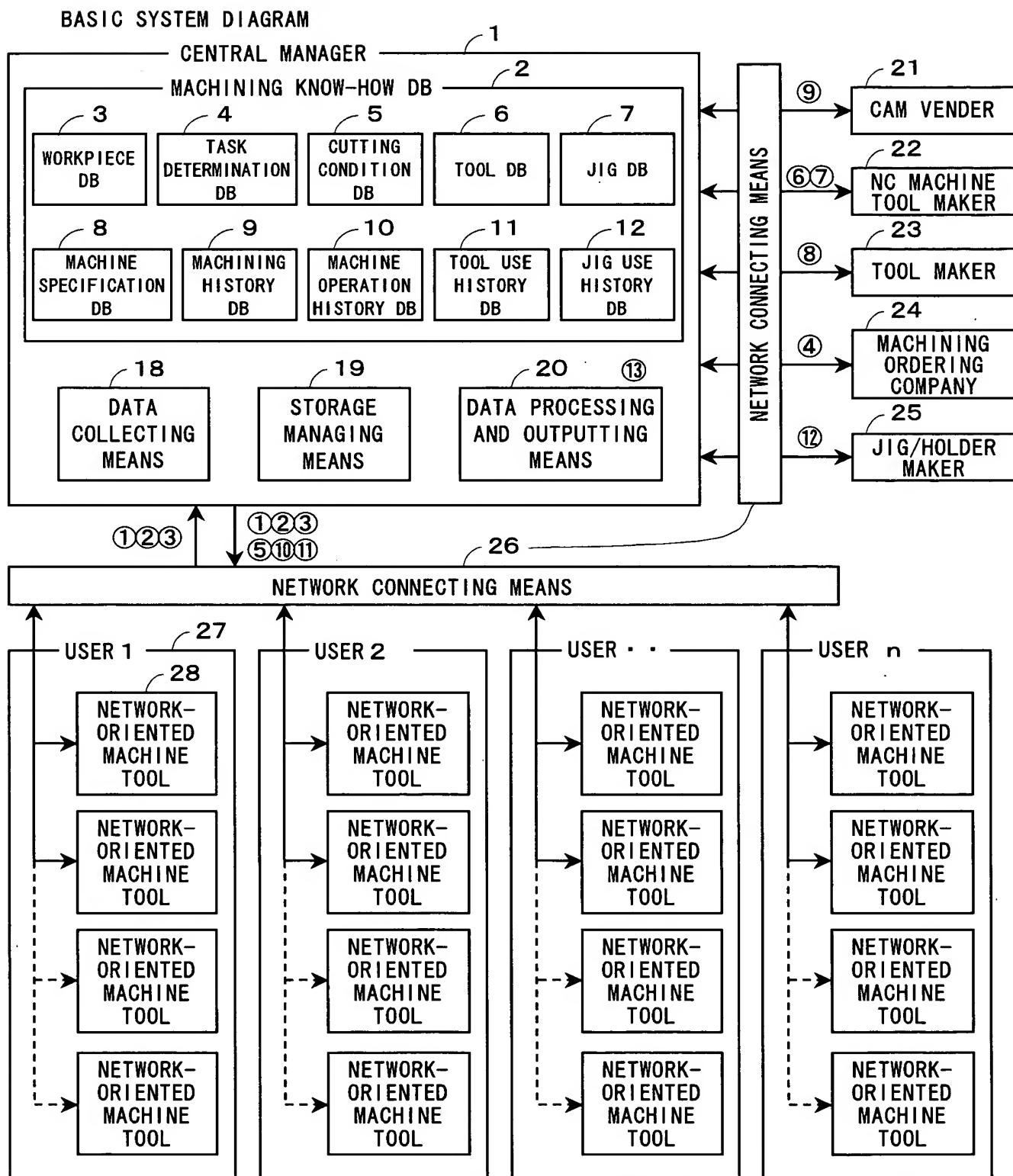
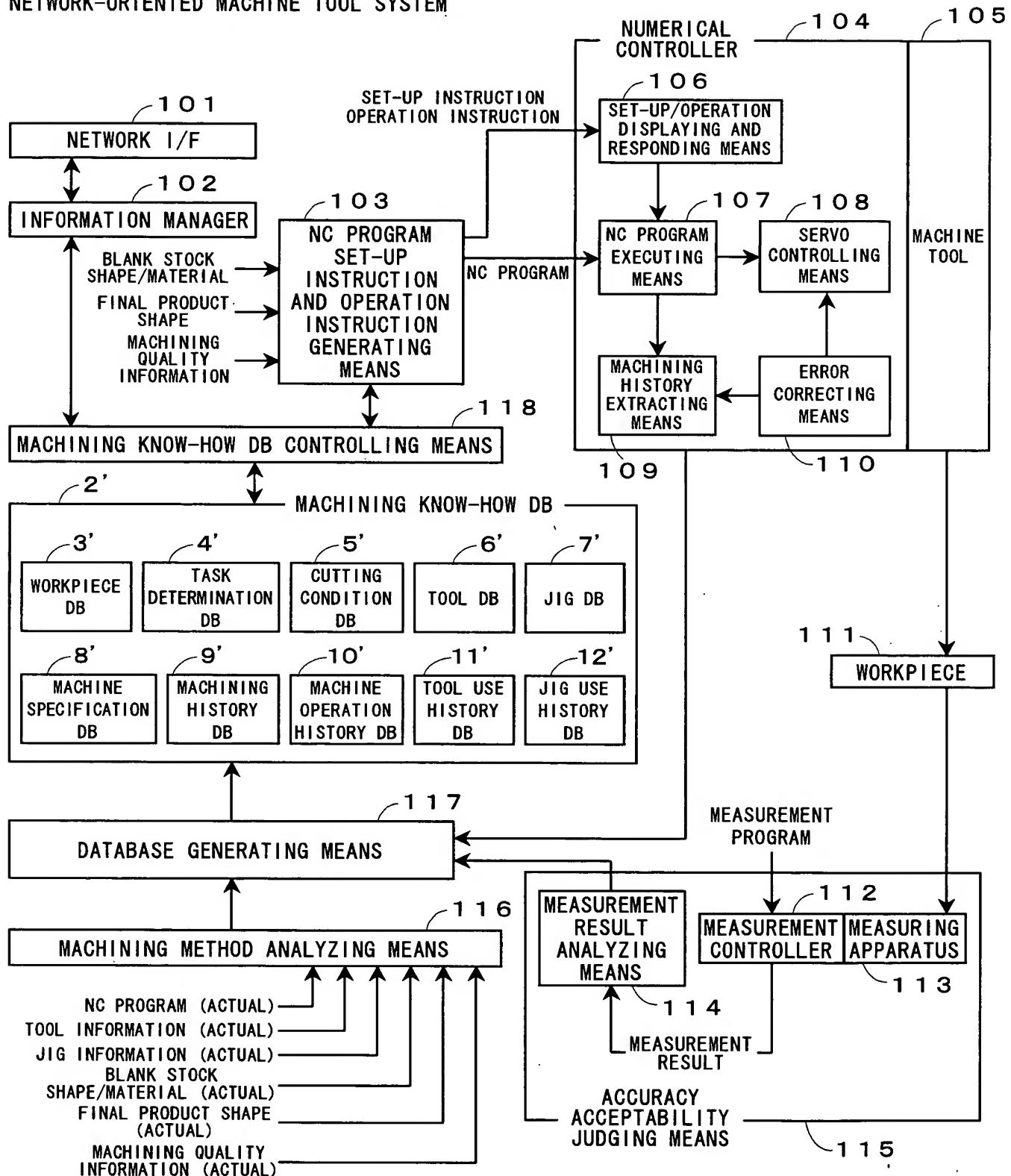


FIG. 3

NETWORK-ORIENTED MACHINE TOOL SYSTEM



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FIG. 4

WORKPIECE DATABASE

| MACHINE ID | WORKPIECE ID | FINAL PRODUCT SHAPE FILE NAME | BLANK STOCK SHAPE FILE NAME | MATERIAL | MACHINING PRODUCT MODEL ID | MACHINING PROGRAM NUMBER | MACHINING PRODUCT MODEL ACCURACY INFORMATION FILE NAME | MACHINING PRODUCT MODEL ACTUAL ACCURACY FILE NAME | MACHINING PART GROUP ID |
|------------|--------------|-------------------------------|-----------------------------|----------|----------------------------|--------------------------|--------------------------------------------------------|---------------------------------------------------|-------------------------|
| M002 | K543-0001 | G54301 | S23015 | S45C | K543 | 00543 | A543 | A543-0001 | P543-1 |
| M002 | K543-0001 | G54301 | S23015 | S45C | K543 | 00543 | A543 | A543-0001 | P543-1 |
| M002 | K543-0001 | G54301 | S23015 | S45C | K543 | 00543 | A543 | A543-0001 | P543-1 |
| M002 | K543-0001 | G54301 | S23015 | S45C | K543 | 00543 | A543 | A543-0001 | P543-1 |
| M002 | K543-0001 | G54301 | S23015 | S45C | K543 | 00543 | A543 | A543-0001 | P543-1 |
| M002 | K543-0001 | G54301 | S23015 | S45C | K543 | 00543 | A543 | A543-0001 | P543-1 |
| M002 | K543-0001 | G54301 | S23015 | S45C | K543 | 00543 | A543 | A543-0001 | P543-1 |
| M002 | K543-0001 | G54301 | S23015 | S45C | K543 | 00543 | A543 | A543-0001 | P543-1 |
| M002 | K543-0001 | G54301 | S23015 | S45C | K543 | 00543 | A543 | A543-0001 | P543-1 |
| M002 | K543-0001 | G54301 | S23015 | S45C | K543 | 00543 | A543 | A543-0001 | P543-2 |
| M002 | K543-0001 | G54301 | S23015 | S45C | K543 | 00543 | A543 | A543-0001 | P543-2 |
| M002 | K543-0001 | G54301 | S23015 | S45C | K543 | 00543 | A543 | A543-0001 | P543-2 |
| M002 | K543-0001 | G54301 | S23015 | S45C | K543 | 00543 | A543 | A543-0001 | P543-2 |

| MACHINING PART GROUP ACCURACY INFORMATION FILE NAME | MACHINING PART GROUP ACTUAL ACCURACY FILE NAME | CLAMP INFORMATION FILE NAME | MACHINING PART ID | MACHINING PART NAME | MACHINING PART FILE NAME | MACHINING PART ACCURACY INFORMATION FILE NAME | MACHINING PART ACTUAL ACCURACY FILE NAME |
|-----------------------------------------------------|------------------------------------------------|-----------------------------|-------------------|---------------------|--------------------------|-----------------------------------------------|------------------------------------------|
| W543-1 | R543-1-0001 | F23015-1 | T543-1-1 | SURFACE | F001 | J543-1-1 | J543-1-1-0001 |
| W543-1 | R543-1-0001 | F23015-1 | T543-1-2 | POCKET | P001 | J543-1-2 | J543-1-2-0001 |
| W543-1 | R543-1-0001 | F23015-1 | T543-1-3 | CHAMFERED HOLE | CH01 | J543-1-3 | J543-1-3-0001 |
| W543-1 | R543-1-0001 | F23015-1 | T543-1-4 | CHAMFERED HOLE | CH02 | J543-1-4 | J543-1-4-0001 |
| W543-1 | R543-1-0001 | F23015-1 | T543-1-5 | CHAMFERED HOLE, | CH03 | J543-1-5 | J543-1-5-0001 |
| W543-1 | R543-1-0001 | F23015-1 | T543-1-6 | CHAMFERED HOLE | CH04 | J543-1-6 | J543-1-6-0001 |
| W543-2 | R543-2-0001 | F23015-2 | T543-2-1 | SURFACE | F002 | J543-2-1 | J543-2-1-0001 |
| W543-2 | R543-2-0001 | F23015-2 | T543-2-2 | SEATED TAP | ZT01 | J543-2-2 | J543-2-2-0001 |
| W543-2 | R543-2-0001 | F23015-2 | T543-2-3 | SEATED TAP | ZT02 | J543-2-3 | J543-2-3-0001 |

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FIG. 5

TASK DETERMINATION DATABASE

| MACHINE ID | TASK DETERMINATION ID | MACHINING PART ID | PART MACHINING NAME | MACHINING TASK ID | MACHINING NAME | MACHINING TASK SEQUENCE | MACHINING TOOL ID | TOOL PATH FILE NAME | MACHINING TASK ACCURACY INFORMATION FILE NAME | MACHINING ACTUAL ACCURACY FILE NAME | MACHINING TASK PERIOD FILE NAME |
|------------|-----------------------|-------------------|---------------------|-------------------|----------------|-------------------------|-------------------|---------------------|-----------------------------------------------|-------------------------------------|---------------------------------|
| M002 | 1 | T543-1-1 | U543-1-1 | SURFACE | V543-1-1-1 | ROUGH SURFACING | 1-1 | 1 | M002TL001 | 0543-1-1-1 | U543-1-1-1-0001 |
| M002 | 2 | T543-1-1 | U543-1-1 | SURFACE | V543-1-1-2 | FINISH SURFACING | 1-2 | 29 | M002TL002 | | T543-1-1-2 |
| M002 | 3 | T543-1-2 | U543-1-2 | POCKET | V543-1-2-1 | CENTERING | 1-5 | 2 | M002TL003 | | T543-1-2-1 |
| M002 | 4 | T543-1-2 | U543-1-2 | POCKET | V543-1-2-2 | DRILLING | 1-16 | 4 | M002TL004 | | T543-1-2-2 |
| M002 | 5 | T543-1-2 | U543-1-2 | POCKET | V543-1-2-3 | ROUGH POCKET MACHINING | 1-17 | 5 | M002TL005 | 0543-1-2-3 | U543-1-2-3-0001 |
| M002 | 6 | T543-1-2 | U543-1-2 | POCKET | V543-1-2-4 | FINISH POCKET MACHINING | 1-18 | 6 | M002TL006 | | T543-1-2-4 |
| M002 | 7 | T543-1-3 | U543-1-3 | CHAMFERED HOLE | V543-1-3-1 | CENTERING | 1-3 | 1 | M002TL007 | | T543-1-3-1 |
| M002 | 8 | T543-1-3 | U543-1-3 | CHAMFERED HOLE | V543-1-3-2 | DRILLING | 1-8 | 3 | M002TL008 | | T543-1-3-2 |
| M002 | 9 | T543-1-3 | U543-1-3 | CHAMFERED HOLE | V543-1-3-3 | CHAMFERING | 1-12 | 8 | M002TL009 | | T543-1-3-3 |
| M002 | 10 | T543-1-4 | U543-1-4 | CHAMFERED HOLE | V543-1-4-1 | CENTERING | 1-6 | 1 | M002TL010 | | T543-1-4-1 |
| M002 | 11 | T543-1-4 | U543-1-4 | CHAMFERED HOLE | V543-1-4-2 | DRILLING | 1-11 | 3 | M002TL011 | | T543-1-4-2 |
| M002 | 12 | T543-1-4 | U543-1-4 | CHAMFERED HOLE | V543-1-4-3 | CHAMFERING | 1-15 | 8 | M002TL012 | | T543-1-4-3 |
| M002 | 13 | T543-1-5 | U543-1-5 | CHAMFERED HOLE | V543-1-5-1 | CENTERING | 1-4 | 1 | M002TL013 | | T543-1-5-1 |
| M002 | 14 | T543-1-5 | U543-1-5 | CHAMFERED HOLE | V543-1-5-2 | DRILLING | 1-9 | 3 | M002TL014 | | T543-1-5-2 |
| M002 | 15 | T543-1-5 | U543-1-5 | CHAMFERED HOLE | V543-1-5-3 | CHAMFERING | 1-13 | 8 | M002TL015 | | T543-1-5-3 |
| M002 | 16 | T543-1-6 | U543-1-6 | CHAMFERED HOLE | V543-1-6-1 | CENTERING | 1-7 | 1 | M002TL016 | | T543-1-6-1 |
| M002 | 17 | T543-1-6 | U543-1-6 | CHAMFERED HOLE | V543-1-6-2 | DRILLING | 1-10 | 3 | M002TL017 | | T543-1-6-2 |
| M002 | 18 | T543-1-6 | U543-1-6 | CHAMFERED HOLE | V543-1-6-3 | CHAMFERING | 1-14 | 8 | M002TL018 | | T543-1-6-3 |
| M002 | 19 | T543-2-1 | U543-2-1 | SURFACE | V543-2-1-1 | ROUGH SURFACING | 2-1 | 1 | M002TL019 | 0543-2-1-1 | U543-2-1-1-0001 |
| M002 | 20 | T543-2-1 | U543-2-1 | SURFACE | V543-2-1-2 | FINISH SURFACING | 2-2 | 29 | M002TL020 | | T543-2-1-2 |
| M002 | 21 | T543-2-2 | U543-2-2 | SEATED TAP | V543-2-2-1 | CENTERING | 2-3 | 1 | M002TL021 | | T543-2-2-1 |
| M002 | 22 | T543-2-2 | U543-2-2 | SEATED TAP | V543-2-2-2 | DRILLING | 2-5 | 13 | M002TL022 | | T543-2-2-2 |
| M002 | 23 | T543-2-2 | U543-2-2 | SEATED TAP | V543-2-2-3 | END MILLING | 2-7 | 20 | M002TL023 | 0543-2-2-3 | U543-2-2-3-0001 |
| M002 | 24 | T543-2-2 | U543-2-2 | SEATED TAP | V543-2-2-4 | TAPPING | 2-9 | 16 | M002TL024 | | T543-2-2-4 |
| M002 | 25 | T543-2-3 | U543-2-3 | SEATED TAP | V543-2-3-1 | CENTERING | 2-4 | 1 | M002TL025 | | T543-2-3-1 |
| M002 | 26 | T543-2-3 | U543-2-3 | SEATED TAP | V543-2-3-2 | DRILLING | 2-6 | 13 | M002TL026 | | T543-2-3-2 |
| M002 | 27 | T543-2-3 | U543-2-3 | SEATED TAP | V543-2-3-3 | END MILLING | 2-8 | 20 | M002TL027 | 0543-2-3-3 | U543-2-3-3-0001 |
| M002 | 28 | T543-2-3 | U543-2-3 | SEATED TAP | V543-2-3-4 | TAPPING | 2-10 | 16 | M002TL028 | | T543-2-3-4 |

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FIG. 6

TOOL PATH FILE (M002TL001)

RP = REFERENCE POINT

| MACHINE ID | X-AXIS COORDINATE OF START POINT | Y-AXIS COORDINATE OF START POINT | Z-AXIS COORDINATE OF START POINT | X-AXIS COORDINATE OF END POINT | Y-AXIS COORDINATE OF END POINT | Z-AXIS COORDINATE OF END POINT | S | M | F | AXIS | INTERPOLATION |
|------------|----------------------------------|----------------------------------|----------------------------------|--------------------------------|--------------------------------|--------------------------------|-----|---|------|------|---------------|
| M002 | RP | RP | RP | 160. 000 | 50. 000 | RP | 400 | 3 | | XY | G0 |
| M002 | 160. 000 | 50. 000 | RP | 160. 000 | 50. 000 | 50. 000 | | 8 | | Z | G0 |
| M002 | 160. 000 | 50. 000 | 50. 000 | 160. 000 | 50. 000 | 0. 100 | | | 2000 | Z | G0 |
| M002 | 160. 000 | 50. 000 | 0. 100 | -160. 000 | 50. 000 | 0. 100 | | | 250 | X | G1 |
| M002 | -160. 000 | 50. 000 | 0. 100 | -160. 000 | -45. 000 | 0. 100 | | | | Y | G0 |
| M002 | -160. 000 | -45. 000 | 0. 100 | 160. 000 | -45. 000 | 0. 100 | | | | X | G1 |
| M002 | 160. 000 | -45. 000 | 0. 100 | 160. 000 | 50. 000 | 0. 100 | 600 | | | Y | G0 |

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| MACHINING TASK ID | MATERIAL | TOOL ID | CUTTING SPEED | FEED PER TOOTH | FEED PER REVOLUTION | CUTTING WIDTH | CUTTING HEIGHT |
|-------------------|----------|---------|---------------|----------------|---------------------|---------------|----------------|
| V543-1-1-1 | S45C | 1 | | | | | |
| V543-1-1-1 | S45C | 1 | | | | | |
| V543-1-1-1 | S45C | 1 | | | | | |
| V543-1-1-1 | S45C | 1 | 100 | 0. 1 | | 80. 000 | 5. 000 |
| V543-1-1-1 | S45C | 1 | 100 | 0. 1 | | 80. 000 | 5. 000 |
| V543-1-1-1 | S45C | 1 | | | | | |

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FIG. 7

CUTTING CONDITION DATABASE

F1: RADIAL FEED PER TOOTH
 F2: AXIAL FEED PER REVOLUTION
 W: CUTTING WIDTH FOR EACH FEED
 H: CUTTING HEIGHT FOR EACH FEED

| MACHINE ID | CUTTING CONDITION ID | MACHINING TASK NAME | WORKPIECE MATERIAL | CUTTING SPEED | F1 | F2 | W | H |
|------------|----------------------|-------------------------|--------------------|---------------|------|------|-----|------|
| M0002 | 1 | ROUGH MILLING | S45C | 125.6 | 0.1 | - | 80 | 4.9 |
| M0002 | 2 | CENTERING | S45C | 9.4 | - | 0.1 | - | - |
| M0002 | 3 | DRILLING | S45C | 25.1 | - | 0.2 | - | - |
| M0002 | 4 | DRILLING | S45C | 28.3 | - | 0.2 | - | - |
| M0002 | 5 | ROUGH POCKET | S45C | 27.5 | 0.07 | 0.1 | 25 | 19.9 |
| M0002 | 6 | FINISH POCKET MACHINING | S45C | 39.2 | 0.1 | 0.1 | 0.1 | 0.1 |
| M0002 | 7 | DRILLING | S45C | 25.7 | - | 0.15 | - | - |
| M0002 | 8 | CHAMFERING | S45C | 25 | - | 0.1 | - | - |
| M0002 | 9 | TAPPING | S45C | 10 | - | 1.25 | - | - |

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TOOL DATABASE (1/2)

FIG. 8 (a)

| MACHINE ID | TOOL ID | TOOL NAME | MAKER NAME | HOLDER MODEL | TIP MODEL | TIP MATERIAL | NOMINAL DIAMETER | H-CODE | D-CODE | TOOTH NUMBER | TOOTH LENGTH | TOOL LENGTH |
|------------|---------|--------------|------------|--------------|-----------|------------------|------------------|--------|--------|--------------|--------------|-------------|
| M002 | 1 | FACE MILL | ABC | A-01 | B-01 | CEMENTED CARBIDE | 80.000 | 1 | 1 | 6 | 10.000 | 20.000 |
| M002 | 2 | CENTER DRILL | ABC | A-02 | B-02 | HIGH-SPEED STEEL | 3.000 | 2 | 2 | - | 5.000 | 20.000 |
| M002 | 3 | DRILL | ABC | A-03 | B-03 | HIGH-SPEED STEEL | 20.000 | 3 | 3 | - | 150.000 | 160.000 |
| M002 | 4 | DRILL | ABC | A-04 | B-04 | HIGH-SPEED STEEL | 30.000 | 4 | 4 | - | 150.000 | 160.000 |
| M002 | 5 | END MILL | ABC | A-05 | B-05 | HIGH-SPEED STEEL | 25.000 | 5 | 5 | 2 | 50.000 | 50.000 |
| M002 | 6 | END MILL | ABC | A-06 | B-06 | HIGH-SPEED STEEL | 25.000 | 6 | 6 | 2 | 35.000 | 50.000 |
| M002 | 7 | DRILL | ABC | A-07 | B-07 | HIGH-SPEED STEEL | 8.200 | 7 | 7 | - | 50.000 | 100.000 |
| M002 | 8 | CHAMFER | ABC | A-08 | B-08 | HIGH-SPEED STEEL | 25.000 | 8 | 8 | 2 | 10.000 | 80.000 |
| M002 | 9 | TAP | ABC | A-09 | B-09 | HIGH-SPEED STEEL | M10 | 9 | 9 | - | 30.000 | 50.000 |
| M002 | 10 | DRILL | ABC | A-10 | B-10 | HIGH-SPEED STEEL | 3.000 | 10 | 10 | - | 100.000 | - |
| M002 | 11 | DRILL | ABC | A-11 | B-11 | HIGH-SPEED STEEL | 5.100 | 11 | 11 | - | 100.000 | - |
| M002 | 12 | DRILL | ABC | A-12 | B-12 | HIGH-SPEED STEEL | 6.500 | 12 | 12 | - | 100.000 | - |
| M002 | 13 | DRILL | ABC | A-13 | B-13 | HIGH-SPEED STEEL | 6.800 | 13 | 13 | - | 120.000 | - |
| M002 | 14 | DRILL | ABC | A-14 | B-14 | HIGH-SPEED STEEL | 8.000 | 14 | 14 | - | 120.00 | - |
| M002 | 15 | DRILL | ABC | A-15 | B-15 | HIGH-SPEED STEEL | 10.000 | 15 | 15 | - | 120.000 | - |
| M002 | 16 | TAP | ABC | A-16 | B-16 | HIGH-SPEED STEEL | M8 | 16 | 16 | - | 30.000 | - |
| M002 | 17 | TAP | ABC | A-17 | B-17 | HIGH-SPEED STEEL | M6 | 17 | 17 | - | 30.000 | - |
| M002 | 18 | TAP | ABC | A-18 | B-18 | HIGH-SPEED STEEL | M12 | 18 | 18 | - | 35.000 | - |
| M002 | 19 | TAP | ABC | A-19 | B-19 | HIGH-SPEED STEEL | M14 | 19 | 19 | - | 35.000 | - |
| M002 | 20 | END MILL | ABC | A-20 | B-20 | HIGH-SPEED STEEL | 6.000 | 20 | 20 | 2 | 20.000 | - |
| M002 | 21 | END MILL | ABC | A-21 | B-21 | HIGH-SPEED STEEL | 8.000 | 21 | 21 | 2 | 25.000 | - |
| M002 | 22 | END MILL | ABC | A-22 | B-22 | HIGH-SPEED STEEL | 10.000 | 22 | 22 | 2 | 25.000 | - |
| M002 | 23 | END MILL | ABC | A-23 | B-23 | HIGH-SPEED STEEL | 12.000 | 23 | 23 | 2 | 25.000 | - |
| M002 | 24 | CENTER DRILL | ABC | A-24 | B-24 | HIGH-SPEED STEEL | 5.000 | 24 | 24 | - | 3.000 | - |
| M002 | 25 | CENTER DRILL | ABC | A-25 | B-25 | HIGH-SPEED STEEL | 1.000 | 25 | 25 | - | 3.000 | - |
| M002 | 26 | CHAMFER | ABC | A-26 | B-26 | HIGH-SPEED STEEL | 20.000 | 26 | 26 | 1 | 10.000 | - |
| M002 | 27 | END MILL | ABC | A-27 | B-27 | HIGH-SPEED STEEL | 35.000 | 27 | 27 | 2 | 50.000 | - |
| M002 | 28 | END MILL | ABC | A-28 | B-28 | HIGH-SPEED STEEL | 16.000 | 28 | 28 | 2 | 30.000 | - |
| M002 | 29 | FACE MILL | ABC | A-29 | B-29 | HIGH-SPEED STEEL | 100.000 | 29 | 29 | 6 | 15.000 | - |
| M002 | 30 | DRILL | ABC | A-30 | B-30 | HIGH-SPEED STEEL | 21.000 | 30 | 30 | - | 100.000 | - |
| M002 | 31 | DRILL | ABC | A-31 | B-31 | HIGH-SPEED STEEL | 22.000 | 31 | 31 | - | 100.000 | - |
| M002 | 32 | DRILL | ABC | A-32 | B-32 | HIGH-SPEED STEEL | 25.000 | 32 | 32 | - | 100.000 | - |

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FIG. 8 (b)

TOOL DATABASE (2/2)

| PITCH | ANGLE | WEAR | SERVICE LIFE | LIFE EXPECTANCY | SERVICE LIFE STATUS |
|-------|-------|--------|--------------|-----------------|---------------------|
| - | 90 | -0.030 | 80,000 | 8,925 | OK |
| - | - | 0.000 | 30,000 | 4,388 | OK |
| - | 118 | 0.000 | 30,000 | 10,812 | OK |
| - | 118 | -0.010 | 30,000 | 66,666 | OK |
| - | - | 0.000 | 90,000 | 9,900 | OK |
| - | - | 0.000 | 80,000 | 8,164 | OK |
| - | - | 0.000 | 80,000 | 64,473 | OK |
| - | 45 | 0.000 | 80,000 | 10,504 | OK |
| 1.25 | 45 | 0.000 | 60,000 | 22,963 | OK |
| - | 118 | -0.050 | 30,000 | 3,564 | OK |
| - | 118 | 0.000 | 70,000 | 2,116 | OK |
| - | 118 | 0.000 | 30,000 | 11,580 | OK |
| - | 118 | 0.000 | 70,000 | 53,092 | OK |
| - | 118 | 0.000 | 50,000 | 32,659 | OK |
| - | 118 | 0.000 | 90,000 | 7,165 | OK |
| 1.25 | - | 0.000 | 90,000 | 36,622 | OK |
| 1.00 | - | 0.000 | 50,000 | 8,937 | OK |
| 1.75 | - | 0.000 | 20,000 | 8,924 | OK |
| 2.00 | - | 0.000 | 30,000 | 58,622 | OK |
| - | - | -0.080 | 30,000 | 0 | END |
| - | - | 0.000 | 70,000 | 9,472 | OK |
| - | - | 0.000 | 70,000 | 22,044 | OK |
| - | - | 0.000 | 80,000 | 0 | END |
| - | 45 | 0.000 | 20,000 | 79,805 | OK |
| - | - | 0.000 | 50,000 | 11,428 | OK |
| - | - | -0.020 | 50,000 | 6,164 | OK |
| - | 45 | -0.030 | 50,000 | 20,976 | OK |
| - | 118 | 0.000 | 50,000 | 53,214 | OK |
| - | 118 | 0.000 | 80,000 | 44,158 | OK |
| - | 118 | 0.000 | 80,000 | 0 | END |

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FIG. 9

JIG DATABASE

| JIG ID | TYPE | MAKER NAME | MODEL | NAME | CLAMPING FORCE (KN) |
|--------|-------------|------------|-------|-----------------------|------------------------|
| 1 | CHUCK | FIX | C-123 | POWER CHUCK | 20 |
| 2 | VICE | FIX | V-116 | POWER VICE | 40 |
| 3 | ROUND TABLE | FIX | E-122 | PRECISION ROUND TABLE | 15 |
| 4 | BLOCK | FIX | B-221 | PRECISION BLOCK | 20 |
| 5 | BLOCK | FIX | B-222 | PRECISION BLOCK | 20 |
| 6 | BLOCK | FIX | B-223 | PRECISION BLOCK | 20 |

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FIG. 10

MACHINE SPECIFICATION DATABASE

| MACHINE ID | MACHINE TYPE | MAKER NAME | MAchine MODEL | MAchine S/N | MOVEMENT (X) | MOVEMENT (Y) | MOVEMENT (Z) | MAXIMUM MACHINING SIZE (DIAMETER) | MAXIMUM MACHINING HEIGHT (LENGTH) |
|------------|------------------|------------|---------------|-------------|--------------|--------------|--------------|-----------------------------------|-----------------------------------|
| M001 | LATHE | DDM | LL-1 | 056 | 220 | - | 400 | 370 | 500 |
| M002 | MACHINING CENTER | DDM | MM-1 | 012 | 560 | 460 | 450 | 500 x 500 | 400 |
| M003 | LATHE | FFM | LT | 185 | 250 | - | 600 | 410 | 550 |
| M004 | LATHE | DDM | LL-2 | 256 | 300 | - | 800 | 370 | 600 |
| M005 | MACHINING CENTER | DDM | MM-2 | 109 | 560 | 610 | 560 | 500 x 500 | 500 |
| M006 | MACHINING CENTER | FFM | MT | 001 | 630 | 600 | 650 | 500 x 500 | 500 |
| M007 | LATHE | FFM | LF | 302 | 345 | - | 995 | 620 | 958 |
| M008 | MACHINING CENTER | FFM | MK | 077 | 1020 | 510 | 510 | 1100 x 600 | 400 |

| SPINDLE ROTATION SPEED | NUMBER OF SPINDLE SPEED RANGES | DIAMETER OF SPINDLE HOLE | ROTARY TOOL SPINDLE ROTATION SPEED | RAPID FEED RATE (X) | RAPID FEED RATE (Y) | RAPID FEED RATE (Z) | TOOL SHANK TYPE | PULL-STUD TYPE |
|------------------------|--------------------------------|--------------------------|------------------------------------|---------------------|---------------------|---------------------|-----------------|----------------|
| 4500 | - | 40 | - | 12000 | - | 12000 | - | - |
| 6000 | 2 | - | - | 20000 | 20000 | 20000 | MAS BT-40 | MAS I |
| 3000 | - | 50 | 2000 | 15000 | - | 15000 | - | - |
| 3000 | - | 50 | 3000 | 10000 | - | 10000 | - | - |
| 10000 | - | - | - | 20000 | 20000 | 20000 | MAS BT-40 | MAS I |
| 12000 | - | - | - | 20000 | 20000 | 20000 | MAS BT-40 | MAS I |
| 24000 | 2 | 130 | - | 20000 | - | 24000 | - | - |
| 8000 | - | - | - | 10000 | 10000 | 10000 | MAS BT-40 | MAS I |

| NUMBER OF ACCOMMODATED TOOLS (NUMBER OF ATTACHED TOOLS) | MAXIMUM TOOL DIAMETER | MAXIMUM TOOL WEIGHT | TOOL CHANGE TIME (30 MINUTES/CONTINUOUS) | SPINDLE MOTOR FEED AXIS MOTOR | REQUIRED POWER |
|---------------------------------------------------------|-----------------------|---------------------|------------------------------------------|-------------------------------|----------------|
| 12 | 16 | - | 0.3 | 15/11 | 4 |
| 40 | 125 | 450 | 1.2 | 30/22 | 20.0 |
| 8 | 16 | - | 0.1 | 15/11 | 50.0 |
| 8 | 32 | - | 0.2 | 22/15 | 20.0 |
| 20 | 120 | 600 | 2.0 | 22/15 | 30.0 |
| 30 | 100 | 800 | 1.5 | 22/15 | 30.0 |
| 12 | 32 | - | 0.4 | 30/22 | 52.6 |
| 80 | 150 | 1000 | 1.6 | 30/22 | 55.0 |

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FIG. 11

MACHINING HISTORY DATABASE

| MACHINE ID | MACHINING HISTORY ID | WORKPIECE ID | ACCURACY ACCEPTABILITY JUDGMENT | MACHINING START TIME | MACHINING END TIME |
|------------|----------------------|--------------|---------------------------------|----------------------|---------------------|
| M002 | 1 | K543-0001 | ACCEPTABLE | 1998/12/07 09:12:20 | 1998/12/07 09:24:33 |
| M002 | 2 | K543-0002 | ACCEPTABLE | 1998/12/07 09:26:01 | 1998/12/07 09:38:14 |
| M002 | 3 | K543-0003 | ACCEPTABLE | 1998/12/07 09:40:05 | 1998/12/07 09:52:19 |
| M002 | 4 | K543-0004 | ACCEPTABLE | 1998/12/07 09:54:10 | 1998/12/07 10:06:23 |
| M002 | 5 | K543-0005 | ACCEPTABLE | 1998/12/07 10:08:07 | 1998/12/07 10:20:20 |
| M002 | 6 | K543-0006 | ACCEPTABLE | 1998/12/07 10:22:43 | 1998/12/07 10:34:57 |
| M002 | 7 | K543-0007 | ACCEPTABLE | 1998/12/07 10:36:25 | 1998/12/07 10:48:39 |
| M002 | 8 | K543-0008 | UNACCEPTABLE | 1998/12/07 10:50:38 | 1998/12/07 11:02:53 |

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FIG. 12 (a)

MACHINE OPERATION HISTORY DATABASE (1/7)

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FIG. 12 (b)

MACHINE OPERATION HISTORY DATABASE (2/7)

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FIG. 12 (c)

MACHINE OPERATION HISTORY DATABASE (3/7)

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FIG. 12 (d)

MACHINE OPERATION HISTORY DATABASE (4/7)

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FIG. 12 (e)

MACHINE OPERATION HISTORY DATABASE (5/7)

| ALARM | | |
|----------|---------------------|---------------------|
| ALARM ID | ISSUED | CANCELED |
| ALM01 | 1998/12/07 08:45:40 | |
| ALM01 | | 1998/12/07 08:45:45 |
| ~ | ~ | ~ |
| EX0570 | 1998/12/07 11:36:45 | |
| EX0570 | | 1998/12/07 11:55:02 |

10/049629-002200

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FIG. 12 (f)

MACHINE OPERATION HISTORY DATABASE (6/7)

| SET-UP | | DOOR OPENING AND CLOSING | |
|---------------------|---------------------|--------------------------|---------------------|
| START | END | DOOR OPENING | DOOR CLOSING |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 1998/12/07 08:46:02 | | | |
| | | | |
| | | 1998/12/07 08:48:24 | |
| | 1998/12/07 09:11:45 | | |
| | | | 1998/12/07 09:12:18 |
| ~ | ~ | | |
| | | | |
| | | 1998/12/07 10:48:41 | |
| | | | 1998/12/07 10:50:36 |
| | | | |
| | | 1998/12/07 11:02:58 | |
| 1998/12/07 11:03:15 | | | |
| | | | |
| | 1998/12/07 11:25:05 | | |
| | | | 1998/12/07 11:25:13 |
| | | | |
| | | 1998/12/07 11:26:34 | |
| | | | 1998/12/07 11:34:59 |
| | | | |
| | | 1998/12/07 11:38:10 | |
| | | | |
| | | | |
| | | | 1998/12/07 11:55:17 |
| | | | |
| | | 1998/12/07 12:01:26 | |
| | | | 1998/12/07 12:02:11 |
| | | | |

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FIG. 12 (g)

MACHINE OPERATION HISTORY DATABASE (7/7)

"2022-07-08" 6:29:54 +00T

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FIG. 13

TOOL USE HISTORY DATABASE

| MACHINE ID | TOOL ID | WORKPIECE ID | MATERIAL | CUTTING SPEED | CUTTING DISTANCE | CUTTING WIDTH | CUTTING DEPTH | AXIAL FEED | RADIAL FEED | MACHINING START TIME |
|------------|---------|--------------|----------|---------------|------------------|---------------|---------------|------------|-------------|----------------------|
| M0002 | 1 | K543 | S45C | 100 | 320 | 80 | 5.000 | 0 | 250 | 1998/12/07 09:12:00 |
| M0002 | 1 | K543 | S45C | 100 | 320 | 80 | 5.000 | 0 | 250 | 1998/12/07 09:13:18 |
| M0002 | 1 | K543 | S45C | 100 | 320 | 80 | 0.500 | 0 | 400 | 1998/12/07 09:14:36 |
| M0002 | 1 | K543 | S45C | 100 | 320 | 80 | 0.500 | 0 | 400 | 1998/12/07 09:15:27 |
| M0002 | 2 | K543 | S45C | 40 | 3 | - | 3.000 | 100 | 0 | 1998/12/07 09:16:30 |
| M0002 | 2 | K543 | S45C | 40 | 3 | - | 3.000 | 100 | 0 | 1998/12/07 09:16:32 |
| M0002 | 2 | K543 | S45C | 40 | 3 | - | 3.000 | 100 | 0 | 1998/12/07 09:16:33 |
| M0002 | 2 | K543 | S45C | 40 | 3 | - | 3.000 | 100 | 0 | 1998/12/07 09:16:35 |
| M0002 | 2 | K543 | S45C | 40 | 3 | - | 3.000 | 100 | 0 | 1998/12/07 09:16:37 |

FIG. 14

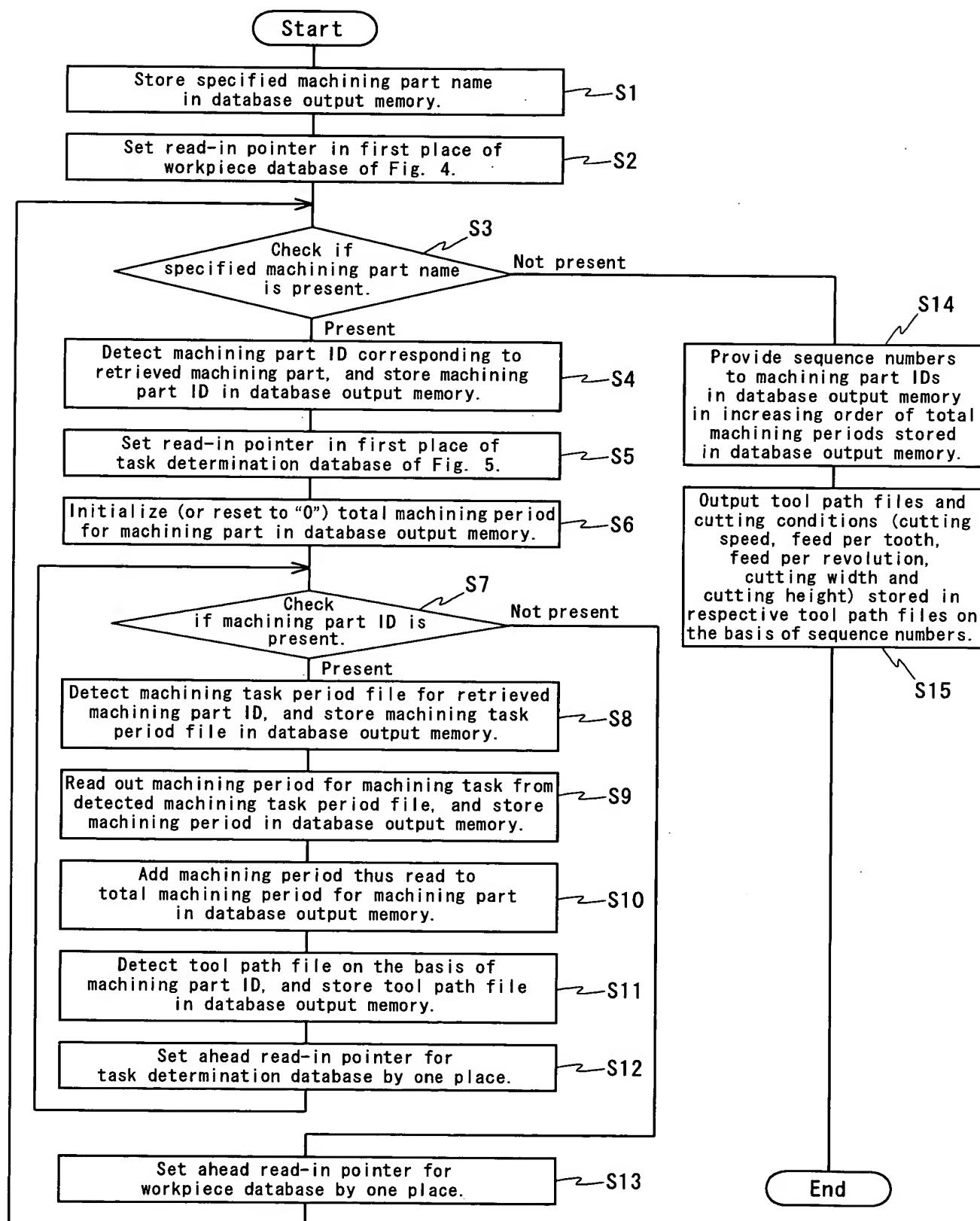
JIG USE HISTORY DATABASE

| MACHINE ID | JIG ID | WORKPIECE ID | JIG ATTACHED POSITION (X) | JIG ATTACHED POSITION (Y) | JIG ATTACHED POSITION (Z) | JIG ATTACHED ANGLE | JIG ATTACHMENT TIME | JIG DETACHMENT TIME |
|------------|--------|--------------|---------------------------|---------------------------|---------------------------|--------------------|---------------------|---------------------|
| M0002 | 4 | K122 | -100.000 | 100.000 | 105.000 | 0.000 | 1998/12/01 15:20 | 1998/12/04 16:30 |
| M0002 | 4 | K122 | 0.000 | 100.000 | 105.000 | 0.000 | 1998/12/01 15:20 | 1998/12/04 16:30 |
| M0002 | 4 | K122 | 100.000 | 100.000 | 105.000 | 0.000 | 1998/12/01 15:20 | 1998/12/04 16:30 |
| M0002 | 4 | K122 | -100.000 | -100.000 | 105.000 | 180.000 | 1998/12/01 15:20 | 1998/12/04 16:30 |
| M0002 | 4 | K122 | 0.000 | -100.000 | 105.000 | 180.000 | 1998/12/01 15:20 | 1998/12/04 16:30 |
| M0002 | 4 | K122 | 100.000 | -100.000 | 105.000 | 180.000 | 1998/12/01 15:20 | 1998/12/04 16:30 |
| M0002 | 2 | K543 | 150.000 | 0.000 | -100.000 | 0.000 | 1998/12/04 17:38 | |

| MACHINING END TIME | CUTTING FLUID |
|---------------------|---------------|
| 1998/12/07 09:13:17 | NO |
| 1998/12/07 09:14:35 | NO |
| 1998/12/07 09:15:26 | NO |
| 1998/12/07 09:16:15 | NO |
| 1998/12/07 09:16:31 | NO |
| 1998/12/07 09:16:33 | NO |
| 1998/12/07 09:16:34 | NO |
| 1998/12/07 09:16:36 | NO |
| 1998/12/07 09:16:38 | NO |

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FIG. 15



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FIG. 16

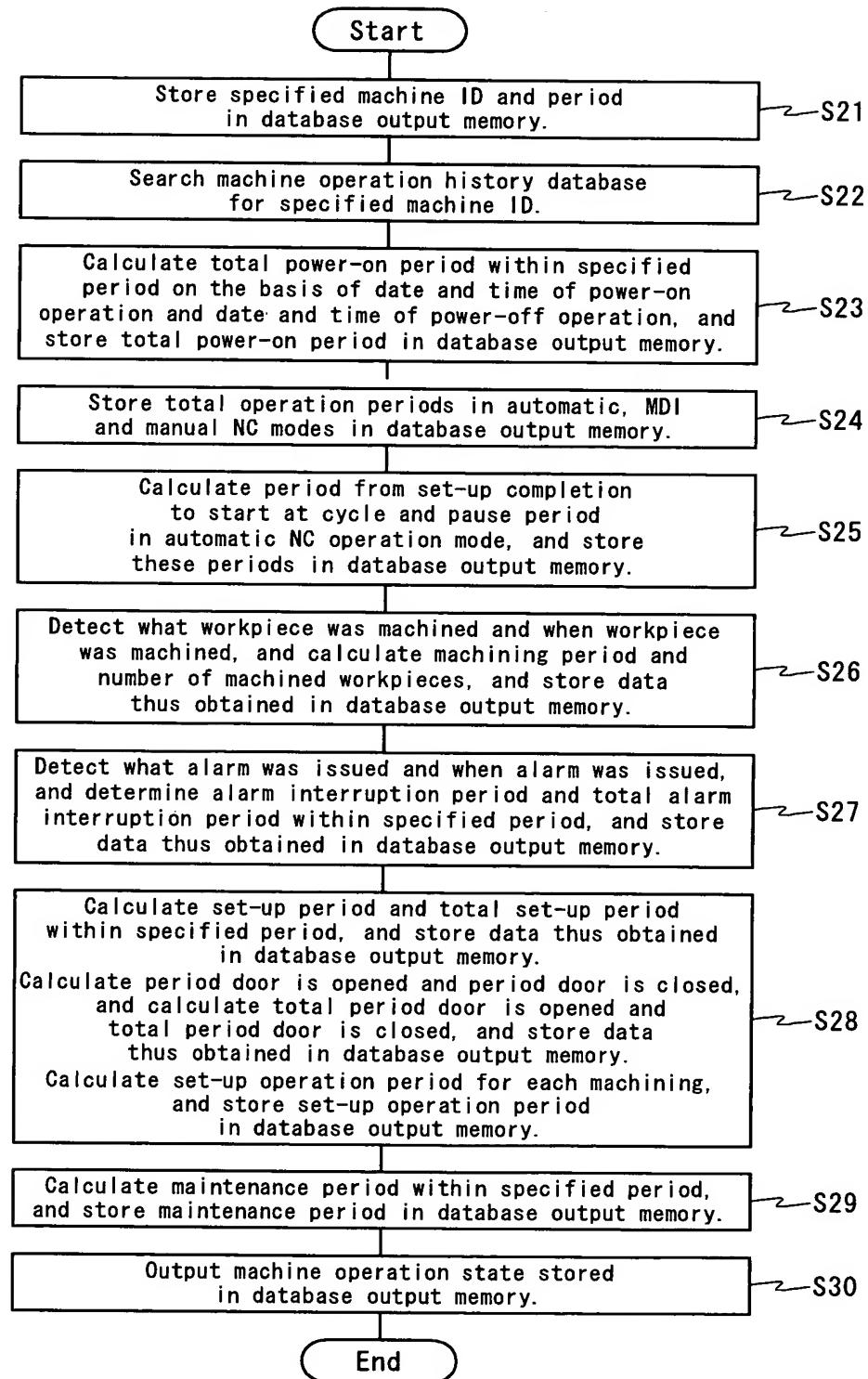
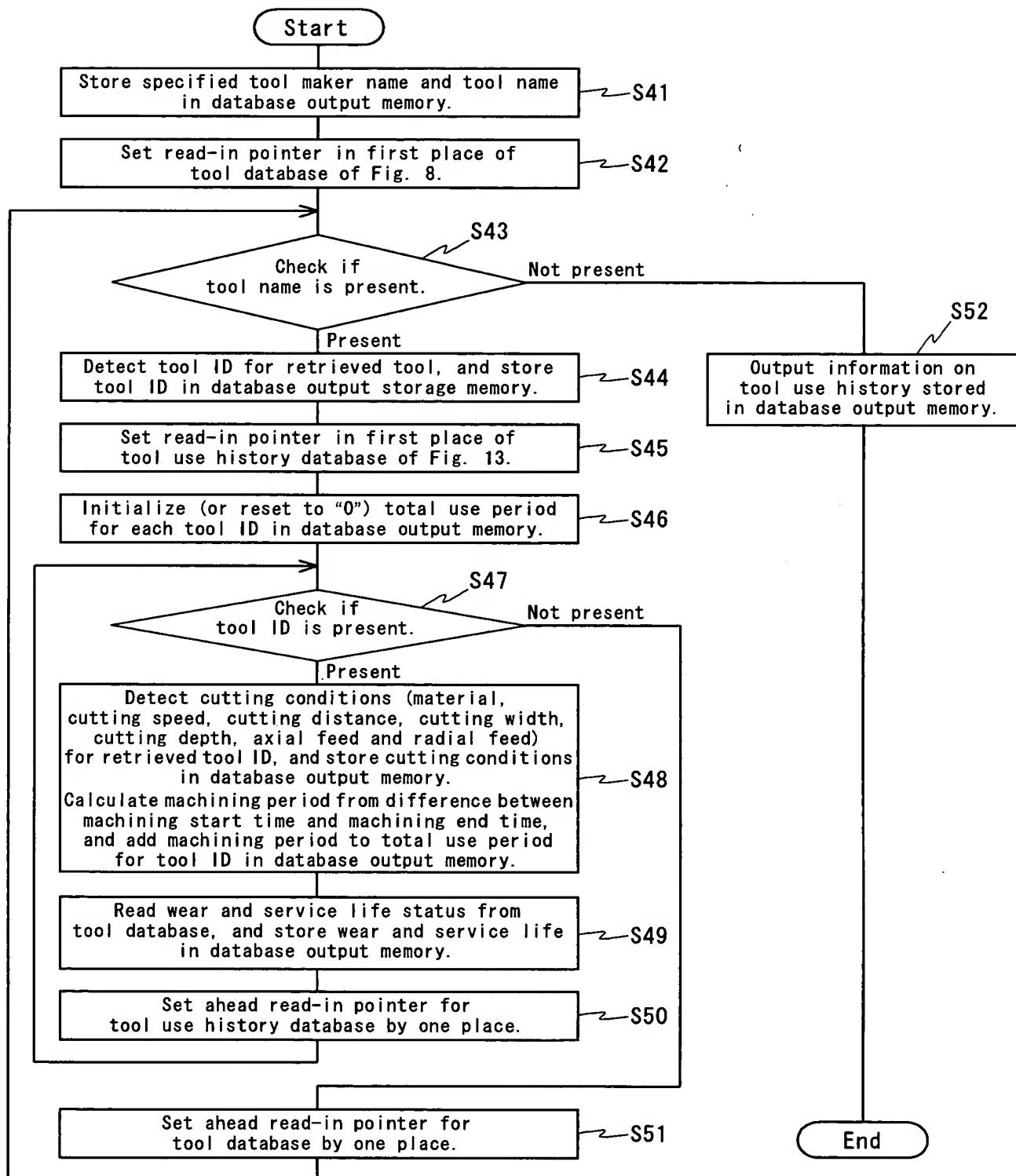


FIG. 17



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FIG. 18

